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1908

- AUTOMATIC - REFRIGERATION

For——

Hotels, Colleges,
Hospitals, Asylums
and similar Institutions

The physical impossibilities of one generation become the commonplace realities of the next

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Compliments of
THE AUTOMATIC REFRIGERATING COMPANY
Hartford, Connecticut.

A:

AUTOMATIC REFRIGERATION

This is from our New York Office, 30 Church St.

Telephone 4723 Cortland.

A representative will call on request.

s, Asylums

ions.

The physical impossibilities of one generation become the commonplace realities of the next.

Compliments of

THE AUTOMATIC REFRIGERATING COMPANY

Hartford, Connecticut.

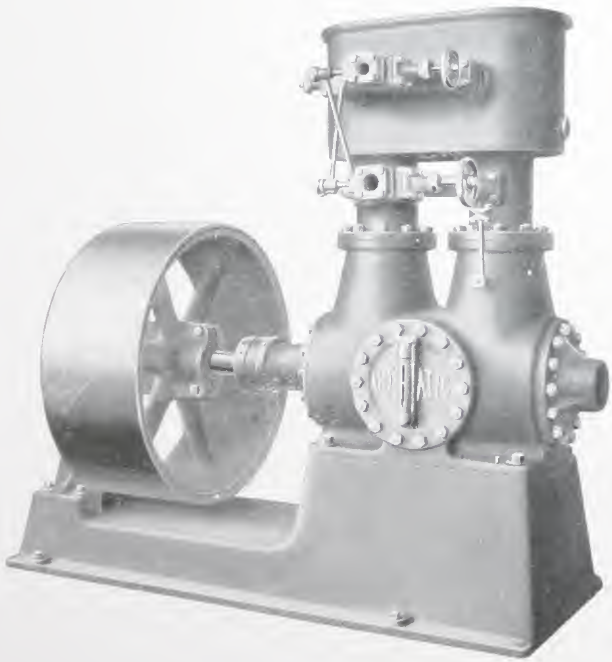

1607 1907

JAMESTOWN TERCENTENNIAL EXPOSITION
ON HAMPTON ROADS, VIRGINIA, 1907
COMMEMORATING THE FIRST PERMANENT ENGLISH SETTLEMENT IN AMERICA
THE JURY OF AWARDS HAS CONFERRED A
SILVER MEDAL
UPON
Automatic Refrigerating Company,
For Automatic System of Refrigeration and Termostat, etc.

HIGHEST AWARD

THE machines described in these pages are of capacities ranging from 710 pounds to 16 tons — that is to say their refrigerating capacities, when running continuously, are equivalent to the melting of from 710 pounds to 16 tons of ice per twenty-four hours; and, when electrically operated, they are driven by direct or by alternating current motors, as required, ranging from 1 to 30 H. P. Each particular machine is designated by the horse power required for its operation, rather than by its capacity. The sizes range as follows:

Horsepower of Motor	1	2	3	5	7½	10	15	20	25	30
Capacity in Pounds	710	1550	2470	4550	7150	9800	15000	20900	26700	32600



The "Automatic" High Efficiency Compressor.

IN GENERAL.

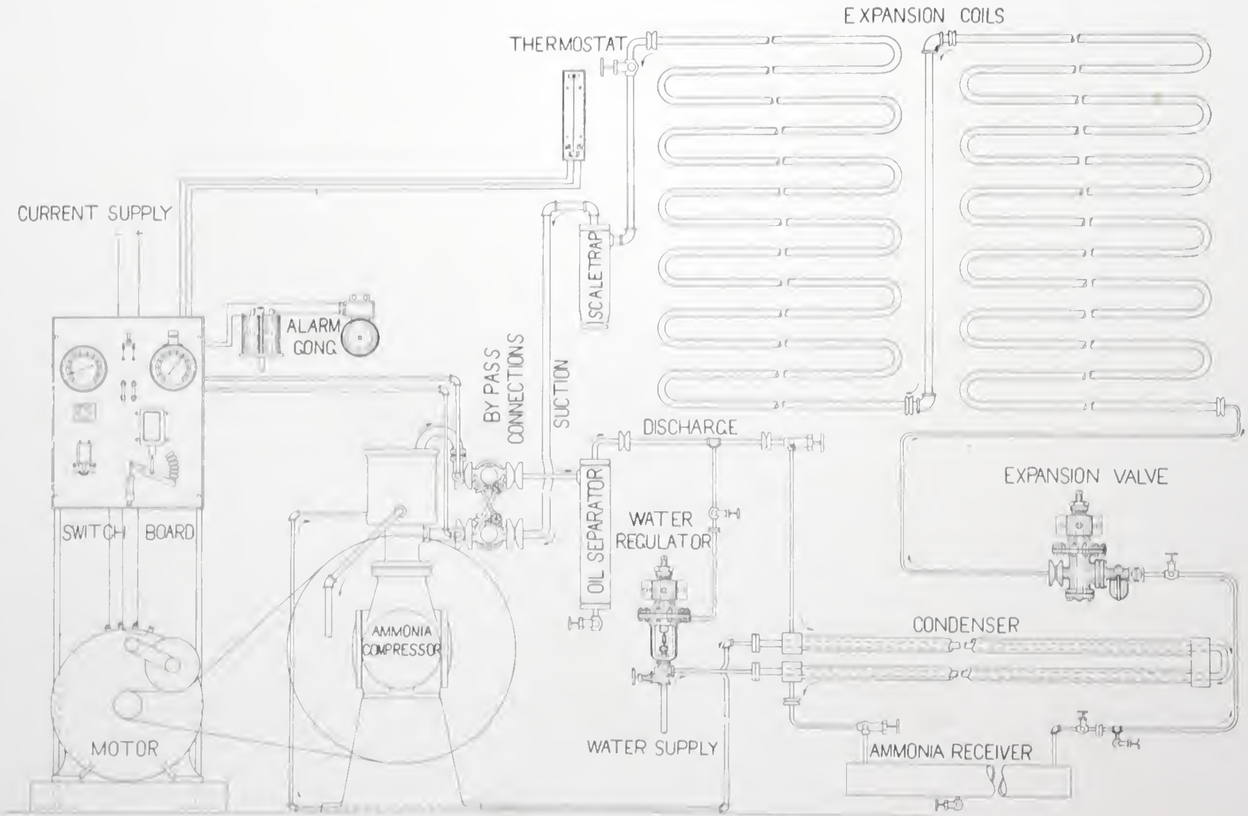
The Automatic Refrigerating Company, having installed numerous plants in Hotels, Colleges, Hospitals, Asylums and similar public and semi-public institutions, takes this occasion for stating the advantages of its Automatic System of Refrigeration as installed in this class of buildings — with the purpose of affording information and suggestions to architects, proprietors, managers, superintendents, and boards of trustees relative to proposed or existing buildings in which they are interested.

Intelligent people are becoming more and more alive to the superiority of refrigerating machines, popularly called "ice machines," for producing the cooling effects for which natural ice is now employed. Such a machine can be used to make ice, which will be more solid and will last longer than the natural product, being as far preferable to ordinary ice as that is to snow ice, and which can and should be made from water of known purity so as to make an absolutely hygienic ice. More often, however, it is simpler and more economical to let the machine itself do the cooling that ice was formerly employed to do, equipping it, if desired, with auxiliary appliances to make ice in small quantities as for drinking water or to make ice cream. By mechanical refrigeration boxes and chill rooms are given a dry, clean coldness that, even when above the freezing point, preserves their perishable contents much longer than is possible with ice placed in an overhead bunker or used in any other manner. Each compartment is given the temperature especially adapted to its particular contents. And if freezing temperatures are desired for the long storage of butter, poultry, furs and other articles, a refrigerating machine is the only practical medium.

Sometimes the machine is made to chill brine, which is then pumped into lines of piping, arranged along the top or sides of the room to be cooled — this being known as the "brine system." A simpler method, and usually the preferable, is the "direct expansion system," in which anhydrous liquid ammonia passes directly into the pipe lines, called "expansion coils," and as it vaporizes takes up the heat from the chill room, fresh water tank, or other place that is to be kept cold. In either system, where a room is to be refrigerated, the piping is placed behind non-conducting shields, so as to insure a proper circulation of the cold air.

This principle of physics, that the vaporizing of a liquid will take up heat from surrounding objects, is at the basis of nearly all of the present day commercial machines. And all things considered, for practical purposes anhydrous ammonia, usually designated simply as "ammonia," is the best refrigerating agent. (The ammonia that produces the refrigerating effect is not to be confused with the common aqua ammonia, which is ammonia gas in solution with water. But if such gas is driven off by heating the solution and is then cooled under sufficient pressure, anhydrous liquid ammonia is obtained.) If one pound of anhydrous liquid ammonia is allowed to pass from a small orifice in the vessel containing it into pipe lines, where it expands to a gas, it will in vaporizing take up enough heat through the walls of the piping to lower the temperature of rather more than five hundred pounds of water one degree, or in other words to absorb over five hundred British Thermal Units. But after having done this work, the ammonia, now in a gaseous form, has exhausted its capacity of absorbing heat until it has been made very dense by compression and has been cooled by passing through pipes in contact with flowing water, such as is drawn from street mains, so as to bring it back to liquid form.

This cycle of operation from a liquid to a gas, and back to a liquid, with the production of refrigeration in the first half of the cycle, is accomplished by means of a refrigerating machine and its pipe connections. The machines heretofore made for this purpose are most excellent in their larger sizes. Such a machine, however, while in operation, needs the constant attendance of an engineer to give satisfactory results. And if the machine is to be run night and day, two or more men are needed to keep the various controlling valves in adjustment and the plant operating at its best efficiency. To secure the full efficiency of operation in a small machine there is required just as constant attendance as with a large plant. It follows therefore, by reason of the high cost of operation, if the machine receives proper attention, and by reason of its inefficiency, if left to take care of itself, that in small sizes the ordinary type of machine is ill adapted to the service now under consideration.



General Arrangement of Complete Automatic System.

THE AUTOMATIC PLANT.

In recognition of the peculiar requirements of the situation there has been developed by this Company, in the past few years, a system of electro-mechanical refrigeration and the complete machinery controlling apparatus relating thereto, that embodies many important improvements over what has gone before. Among the more prominent of these improvements are:

FIRST.

An Automatic Expansion Valve. To maintain a given temperature in the air of a room surrounding expansion coils of given dimensions, there must be fed through the expansion valve a certain quantity of liquid ammonia and there must be maintained a certain pressure in the expansion coils as the ammonia vaporizes, so that the heat absorbed by the vaporizing ammonia will just balance the heat transmitting power of the coil surfaces under the existing conditions of temperature inside and outside of the coils. If too little ammonia is fed through the valve, there will be a loss due to an expenditure of power without obtaining the desired temperature in the room. On the other hand if too much ammonia passes through, there will be a loss due to circulating more refrigerant than is required, and there will be a further loss as shown by frost appearing on parts of the piping where the cooling effect is not desired. And the difficulty is that the expansion valve cannot be regulated by hand so as to remain in an adjustment suited to the varying requirements of the chill rooms, or cold compartments, from which cooled food products are taken and into which warm supplies are being put. To adjust the valve as necessary from time to time, which may be as often as several times a day, other machines rely on the watchfulness of the attendant with the consequence that, if he is neglectful, the efficiency of the plant suffers. It is, however, a scientific fact that for every density corresponding to a given temperature there is also a corresponding pressure. Advantage is taken of this fact in the design of the expansion valve made by this Company. This valve is so constructed that, for any given temperature to be maintained around the expansion coils, there will be maintained within the coils a density of vapor proportioned to and governed by the pressure of the vapor itself. By this means a better regulation is obtained than is ever possible with the closest personal attention.

SECOND.

An Automatic Water Valve. To liquefy the gas that has been compressed and that has thereby been much heated, it is necessary to cool the gas by passing it through a condenser. Here, again, is a condition where too little water will prevent an easy liquefaction of the gas and will cause a waste of the power used to operate the plant; and where, on the other hand, too much water will result in waste. The proper quantity of water depends on the temperature and corresponding pressure of the compressed air. With other machines, the quantity of water is regulated by hand, with the chance of having a too great or a too small supply. The water valve made by this Company is governed by both the temperature and the corresponding pressure of the compressed gas so as to regulate the supply of condensing water. This regulation also is more accurate than what could be secured by personal attendance.

THIRD.

The Thermostatic Control of the Starting and Stopping of the Electric Motor driving the Compressor.

Very large plants are operated by steam power. But the wide and increasing employment and the diminishing cost of electric power are opening up possibilities of economical operation and perfection of control that have hitherto been undreamed of in refrigeration practice. The engineer in charge of the ordinary machine regulates his plant very much as a householder looks after his furnace in winter. If the thermometer in the living room shows the temperature to be too low, the furnace draft is opened and the fire is shaken down; if the thermometer shows the room is too warm, the furnace is checked. So if the thermometer in the chill room shows too high a temperature, the engineer starts up or runs his machine faster; and when the temperature gets too cold, he reverses the process. In the complete automatic system a perfected thermostat automatically controls the starting and stopping of the machine so as to maintain any desired temperature within a degree or two of a predetermined medium. Thus if the medium temperature is to be 35° F., the temperature in the room will not vary but a degree or two, (according to the closeness of the adjustment), above or below that point, owing to the automatic starting of the machine when the temperature runs up to 36° or 37° F. and to its stoppage when the temperature falls again to 33° or 34° F. This thermostat can be adjusted to maintain any practicable temperature down even as low as 0° F.

FOURTH.

The High Pressure Safety Cutoff. Sometimes it happens that there is a failure of the supply of water entering the condenser and the compressor water jacket. For instance, in case of fire in the vicinity of the plant, the fire engines for the time being may take all the supply from the mains. Again the supply is sometimes shut off to repair the pipes or to make new connections. If a machine continues to run under such conditions, an unduly high pressure will develop in the compressor. Through the operation of the safety cut-off the increasing pressure of the compressed gas, tending to become excessive, cuts off the electric current supplied to the motor and then, when the pressure returns to normal, again starts up the machine. The only disadvantage, therefore, that can occur is that, while the running of the machine is interrupted, the temperature may rise in the chill room; but to give warning when this happens the regulator is so devised that when the motor stops a bell is rung.

FIFTH.

The Prevention of Lubricating Oil Flooding the Expansion Coils. Many machines suffer in efficiency after a time by the lubricating oil passing into the system beyond the compressor so as to choke the valves and to prevent the coils from properly taking up the heat. Such losses are here prevented by the special and peculiar construction of the compressor. Just as in the human system, the heart draws the blood laden with impurities from the venis and forces it into the lungs to be oxygenated from the air; so in a refrigerating system the compressor draws from the expansion coils the heat laden gas and forces it into the condenser to be cooled and liquefied. The construction used by this Company prevents any "heart disease" of the compressor.

To see one of these machines intermittently starting and stopping, doing its own work quietly and efficiently in obedience to an unseen power, almost suggests to the observer the idea that it is a sentient being, or, as the early Latins believed of every tree, river and natural object, that it has a peculiar animating spirit. A terse opinion, by a practical business man, as to the actual working of the system, is contained in the following letter:

"SELMA UNION SLAUGHTER HOUSE & PACKING CO.,

SELMA, ALA., July 8, 1908.

MESSRS. SWIFT & CO.,
Chicago, Ill.

Gentlemen: — Your letter of June 22d reached me today, and contents noted; in reply to your inquiry regarding my automatic refrigerating machine, I beg to advise that I find it to be all the makers claim it to be; in other words, it is giving entire satisfaction. I have no use for an engineer with the machine as it works automaticcally and looks after itself. I would not give it for any machine I ever saw — would be glad to give you any further information you desire. My machine has been in operation since February this year without the least bit of trouble.

Yours respectfully,

L. C. CLARK,
Pres. & Genl. Mgr."

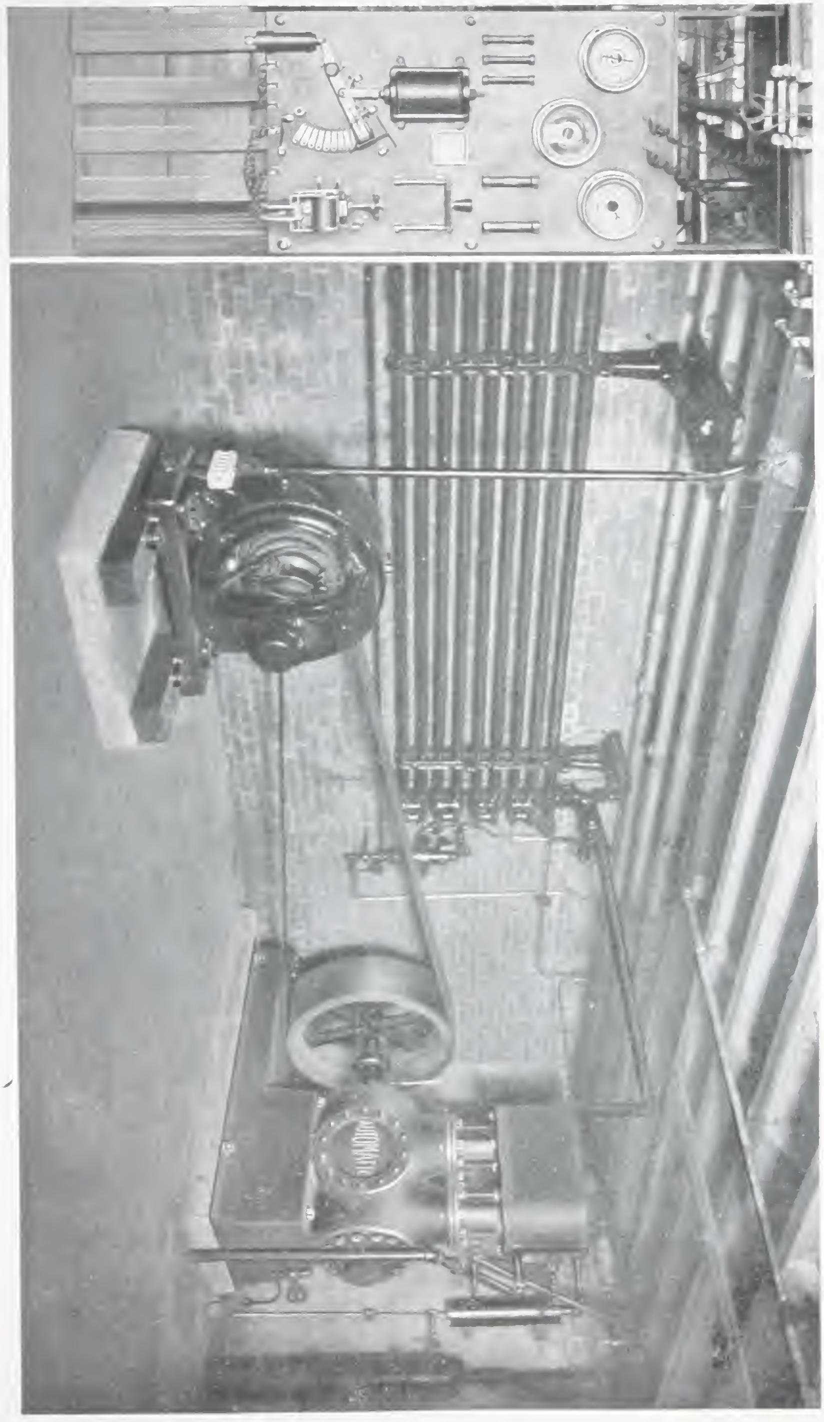
It may be added that, within three weeks after the date of this letter, a Clyde steamship was plowing the sea having in its hold a complete automatic refrigerating plant from this Company for a Florida branch of Swift & Co.

The complete automatic system, which alone is adequate for all kinds of service, requires electric power to make possible the thermostatic control of its operation. The semi-automatic system, dispensing with the thermostat, but having the automatic expansion valve and the automatic water valve and the other special features, can be operated with any kind of power. Where only one or two rooms are to be refrigerated that are closed entirely over night, it is possible to employ the semi-automatic system by starting the machine in the morning and shutting it down at night.

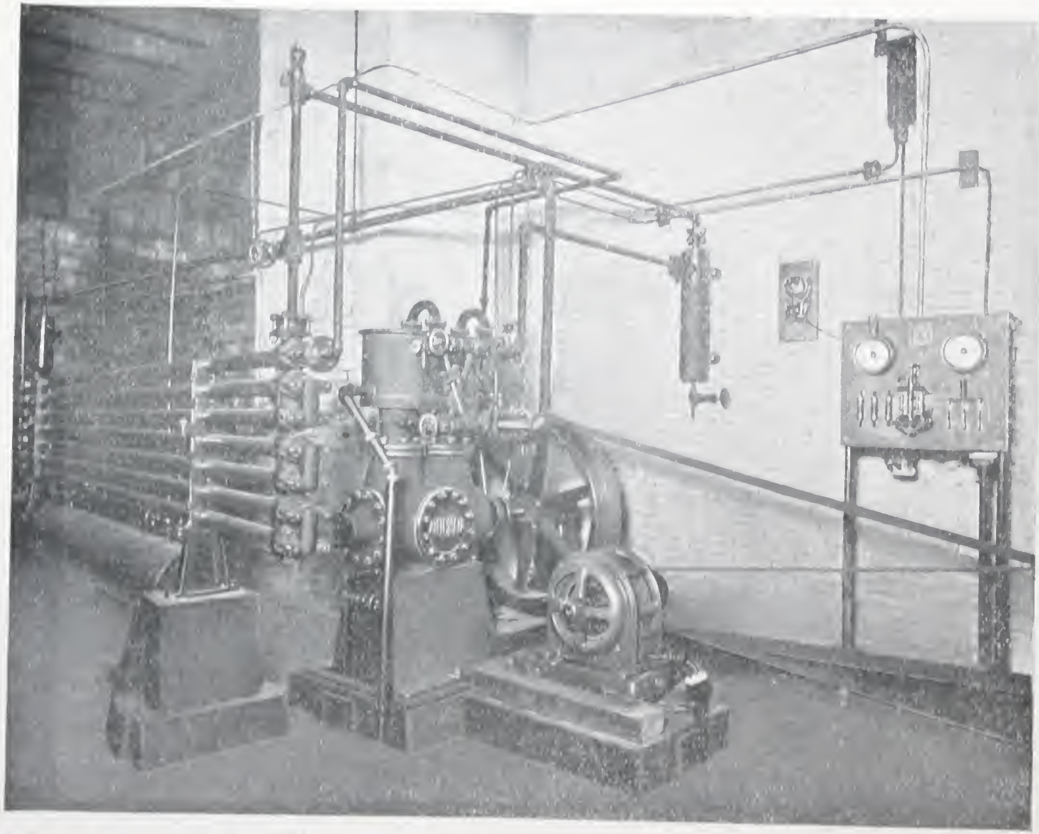
Usually the direct expansion system of piping is used, whether for one room or for any number of rooms in series. If desired, and in some circumstances by preference, the brine system is employed. The brine pumps, and also sweet water pumps for the circulation of drinking water, can be thermostatically controlled.

There are various auxiliary appliances with which the machines are equipped to meet special requirements, as for instance where it is desired to freeze ice cream.

The special features of the system of this Company are fully covered by patents issued and by applications pending.



Thermostatically Controlled Starter and 15 H. P. Plant with D. C. Motor.



7½ H. P. Plant with High Speed A. C. Motor, speed reducing counter shaft on the right not shown.

DIAGRAMS.

In the following pages are shown a number of skeleton diagrams illustrating the adaptability of this automatic system to the most diverse conditions, both in respect to the number and arrangement of the rooms or boxes and also in respect to the temperatures to be maintained.

Diagram I, on page 17, Hotel Heublein, Hartford, Conn. This installation, a 10 H. P. plant, is remarkable for the large number of compartments — eleven — in series that are refrigerated by one machine. For convenience of illustration the piping is represented isometrically and the motor and compressor in elevation. As will be observed, the freezer is No 10, in order from the compressor and carries a temperature of 18°. The table in the drawing also indicate proper temperatures for various food articles. As a matter of fact some of the boxes are located on a floor above the others. By suitable by-passes, not shown in the drawing, any one or more of the boxes may be cut out of the series. This action is as simple as turning on or off steam from a radiator. So also, by similar by-pass regulation, the refrigerating effect in any box can be increased or diminished, to any temperature desired, by cutting in or out a part of the pipe coils. The thermostat, for regulating the entire series and itself adjustable, is placed in No. 1 near a coil through which passes the ammonia that has gone through all the boxes.

Diagram II, on page 18, Hotel Green, Danbury, Conn. This 3 H. P. plant is a typical hotel installation of moderate size and was put in when the building was erected. The drawing represents a plan view. The "starter" is similar to that shown in the photograph on page 11. Instead of the slow speed motor ordinarily employed, a high speed motor is used, requiring a pulley and countershaft, as shown, to give the proper reduction of speed for the compressor. From the compressor the hot gas passes to the double pipe condenser, of the preferred counter current type. From the condenser the liquefied ammonia flows to the receiver, from which its passage into box No. 1 is regulated by the expansion valve. Box No. 5 contains the thermostat. Box No. 4 is heavily piped, so that, if desired, by putting all the coils in series, it can be used as a freezer. If the reader has ice cooled boxes he may find it of interest to place a thermometer near the food in his several boxes and then compare the readings with the temperatures given in the tables of this and the preceding diagram. The hotel management, in the letter given on page 24, state

that, as compared with the ice method, "we get a much better result, as by a proper regulation of the by-passes between the boxes, we can have any temperature desired in the various boxes . . . . an effect impossible to obtain with the old style iced box."

Diagram III, on page 19. Norwich Hospital for Insane, Preston, Conn., near Norwich. The diagram is a plan view. As a matter of fact the brine tank is on the floor below the other two compartments. The installation is doubly interesting in that it is in part an ice making plant and is in part the more usual chill rooms, cooled, however, by the brine circulating system. The machine is of the 7½ H. P. size. A No. 2 screw brine pump is driven by a ½ H. P. motor on the same base with the pump. A thermostat connected with the brine tank controls the starting and stopping of the motor driven compressor so as to maintain in the tank a proper freezing temperature of 17°. Twelve 100 lb. ice cans, 8 x 16 x 32 inches, are supported in the tank by a suitable rack. Another thermostat in room No. 2 controls the starting and stopping of the electrically driven brine pump so as to maintain there a temperature of 45°. The brine coils are placed in a bunker in the upper part of the compartment so as to cool three sub-compartments underneath the bunker and separated from one another by vertical partitions. A separation into compartments is of advantage where each is to contain separate articles of food as milk, vegetables and eggs. Of course a similar arrangement of a common overhead bunker is equally feasible with the direct expansion system. In compartment No. 1 the piping is also placed in an overhead bunker. The diagram of this latter piping shows a by-pass arrangement whereby one quarter, one half or three quarters of the piping may be cut out so as to maintain correspondingly higher ranges of temperature as desired. And if all four coils are put in series the temperature maintained will be much below the 45° stated in the table.

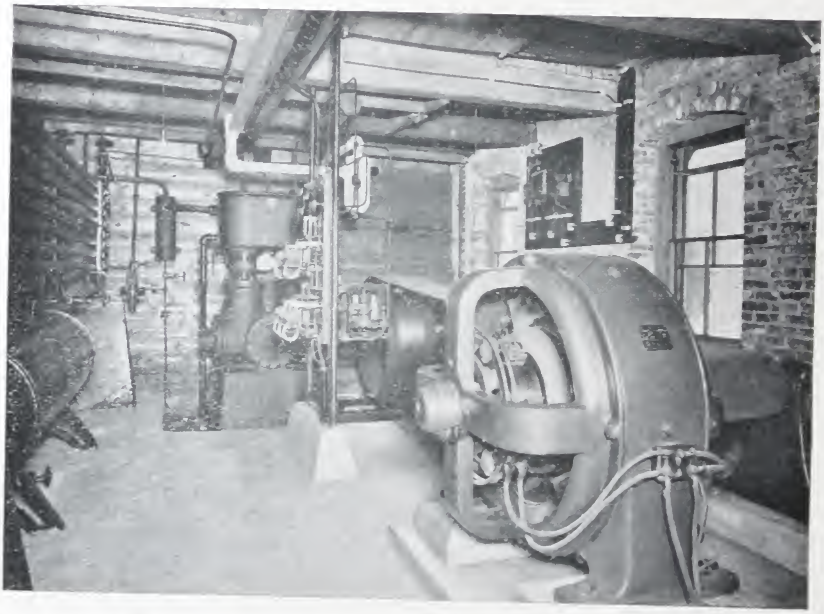
Diagram IV, on page 20. The Westover School Corporation, Middlebury, Conn. The diagram is the only one of those given illustrating a semi-automatic plant, which is of 5 H. P. As steam is used in the building for other purposes, the customer decided upon a direct connected steam engine drive for the compressor. Accordingly there is no thermostatic control of the plant. The compressor is run during the day and then shut down over night. The piping in the three compartments is so proportioned as to approximately maintain the temperatures stated in the table. In box No. 1 the piping is placed in an overhead bunker. In compartment No. 2 the piping cools an overhead fresh water tank so as to freeze ice around the coils during the day — the ice melting away by morning. And in compartment No. 3 the piping cools an overhead brine tank.

A second important characteristic feature of the installation is its ice cream making apparatus. As shown an electric motor is connected for driving an improved ice cream freezer and also a brine pump. The function of the pump is to draw freezing brine from the brine tank and to force it through the channels surrounding the cream to be frozen. In making up a batch, proper proportions of ingredients for the cream are first placed in the mixer on top and the mixture is then drawn off into the freezer proper, underneath. The motor operating the freezer and brine pump is then started by a hand switch. When the cream has been frozen, but is still soft, the motor is stopped and the cream is run into moulds. These moulds are then placed on shelving between the side coils, shown at the right of No. 3, until the cream has become hardened.

Diagram V, on page 21, Georgia State Board of Health, Atlanta, Ga. The two compartments here shown isometrically are used for scientific purposes. This installation has been selected for illustration, partly because it exhibits a small plant operated by a 2 H. P. machine, but principally on account of the possibilities that it suggests. The larger compartment is automtaically kept *down* to a temperature of 70° in summer weather by the refrigerating machine. During the cooler months its temperature is kept **up** to 70° by a thermostatically controlled electric heater. This method of maintaining a moderate even temperature throughout the year can be extended to vessels, hospitals and other buildings. For there are several well-known concerns that install thermostatically controlled steam, hot water and hot air heating systems. By such a system the temperature of a building could be kept from falling say below 70° in winter; and by the system of this Company its temperature could be kept from rising say above 74° in summer. To prevent warm air from coming in from the outside, the doors and windows would have to be closed. And for securing the requisite freshness of air, a forced air circulating system, preferably with apparatus for purifying the air from dust and germs, would be a necessary adjunct.

Diagram VI, on page 22, Child's Restaurant, 47 Broadway, New York City. This skeleton vertical diagram, of a 15 H. P. plant installed with the fitting up of the building, shows how far apart, when necessary, the various compartments may be placed and the diversity of uses to which they may be put. The piping extends through four stories and nearly the length of a deep building, extending from Broadway to Trinity Place. It is to be understood that here, as in every case, the expansion piping connecting the several places to be refrigerated is insulated to keep out the heat. The usual by-passes are also provided to cut in or out at will some of the boxes and also to increase or to diminish the piping in series in each

compartment. This restaurant will seat seven hundred patrons at one time; it is a distinctively midday lunching place. The ice making tank, being No. 1 in order from the receiver, contains forty-two 30 lb. ice cans, 3 x 11½ x 22 inches, to make ice for table use. In hot weather the cans are "pulled" twice a day. The water tanks cool drinking water for twenty-four hundred persons per noon, allowing a pint to a person. The thermostat is in No. 16. As in some other cases previously shown, the compressor has considerable reserve capacity so as to permit of additional compartments being refrigerated, if so desired in the future.



30 H. P. Plant with D. C. Motor in the foreground.

Hotel Heublein

No.	Use	Length	Width	Height	Cubic Ft	Temp
1	POULTRY	6	6	7	252	36
2	POULTRY	6	6	7	252	36
3	BEER	6	8	6	288	45
4	BAR BOX	18	2	3	108	40
5	MILK	4	2	3	24	40
6	BAKER	5	3	1½	22½	45
7	FISH	2	8	2½	40	32
8	GENERAL	18	13	7	1638	45
9	BEER	12	10	6	720	45
10	FREEZER	9	9	7	567	18
11	SERVING	9	5½	5	247½	36

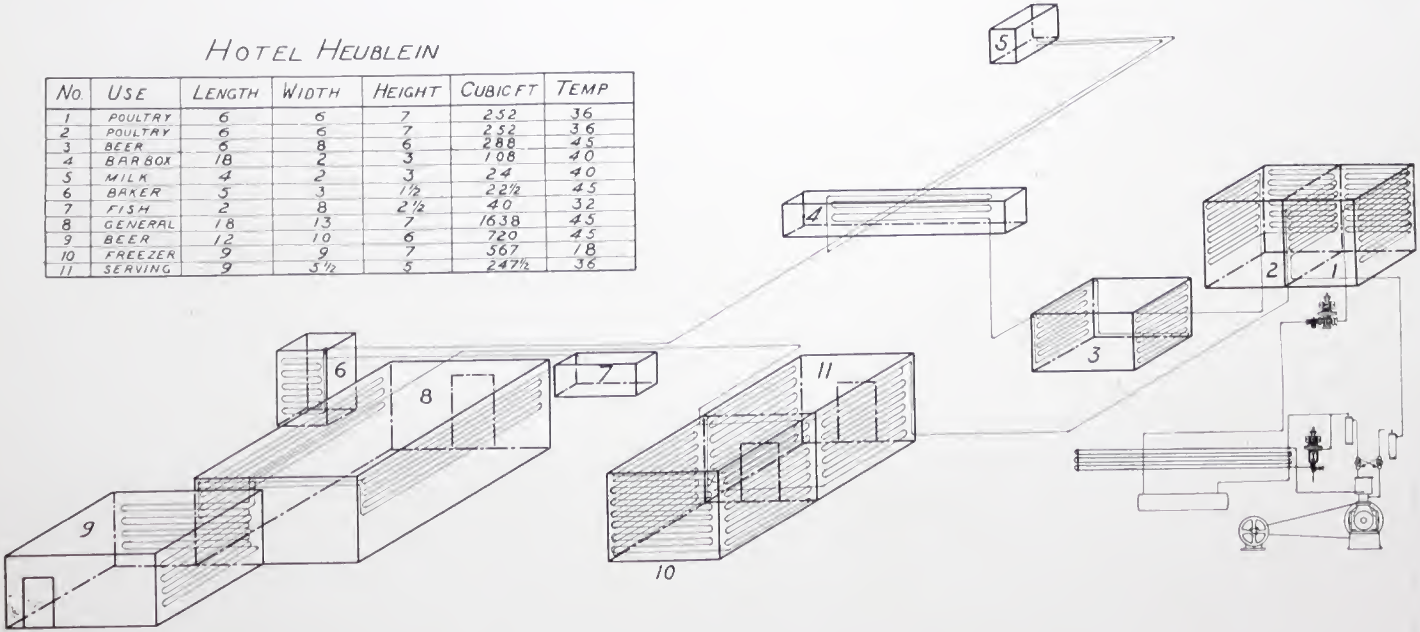


DIAGRAM I

HOTEL GREEN

No.	Use	Length	Width	Height	Cubic Ft	Temp.
1	BEER BOX	12	5	6	360	36°
2	WINE	7½	1¼	7½	70	36
3	MEAT	6	7½	7	315	36
4	FRUIT & VEGETABLES	6	6	7	252	45
5	SERVING	6	6	7	252	40

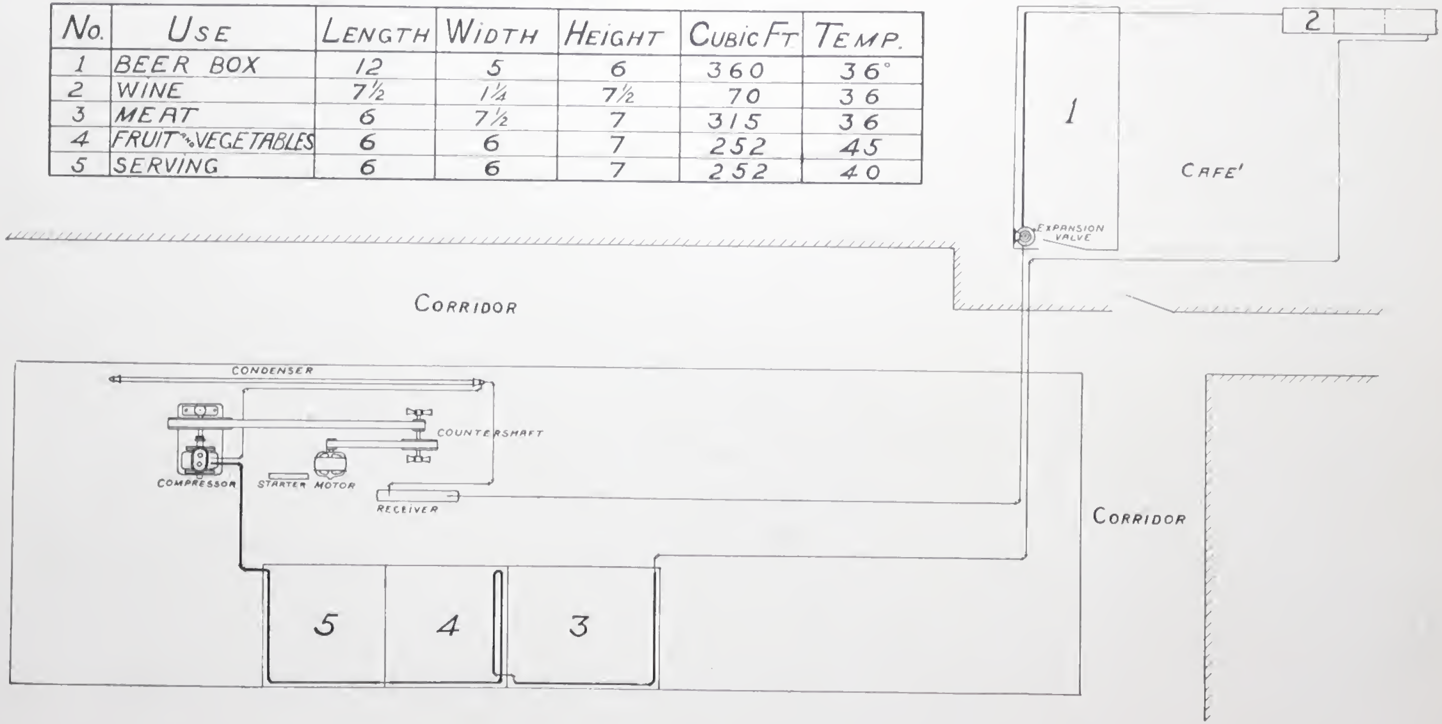


DIAGRAM II.

NORWICH HOSPITAL FOR INSANE

No.	USE	LENGTH	WIDTH	HEIGHT	CUBIC FT	TEMP.
1	GENERAL	14½	6	13	1131	45
2	GENERAL	20½	7½	13	1998½	45
3	BRINE TANK	15½	4	4½	279	17

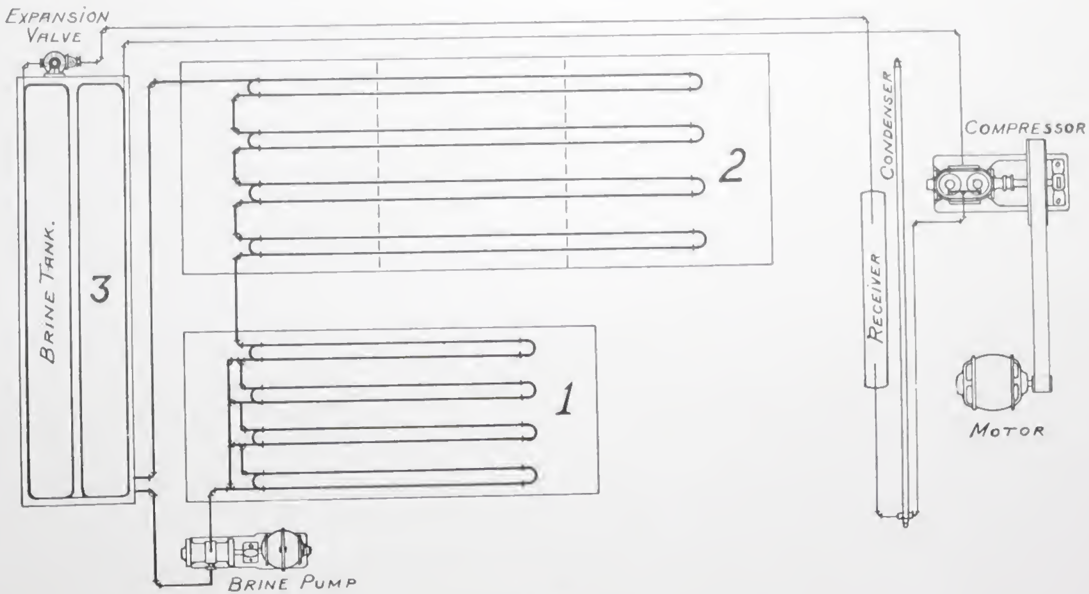


DIAGRAM III

THE WESTOVER SCHOOL CORPORATION

No.	Use	Length	Width	Height	Cubic Ft.	Temp.
1	SERVING	4'	3'	4'	48	36
2	VEGETABLES	17'8"	10'8"	12'5"	2340	36
3	MEAT	12'10"	10'8"	12'5"	1700	34

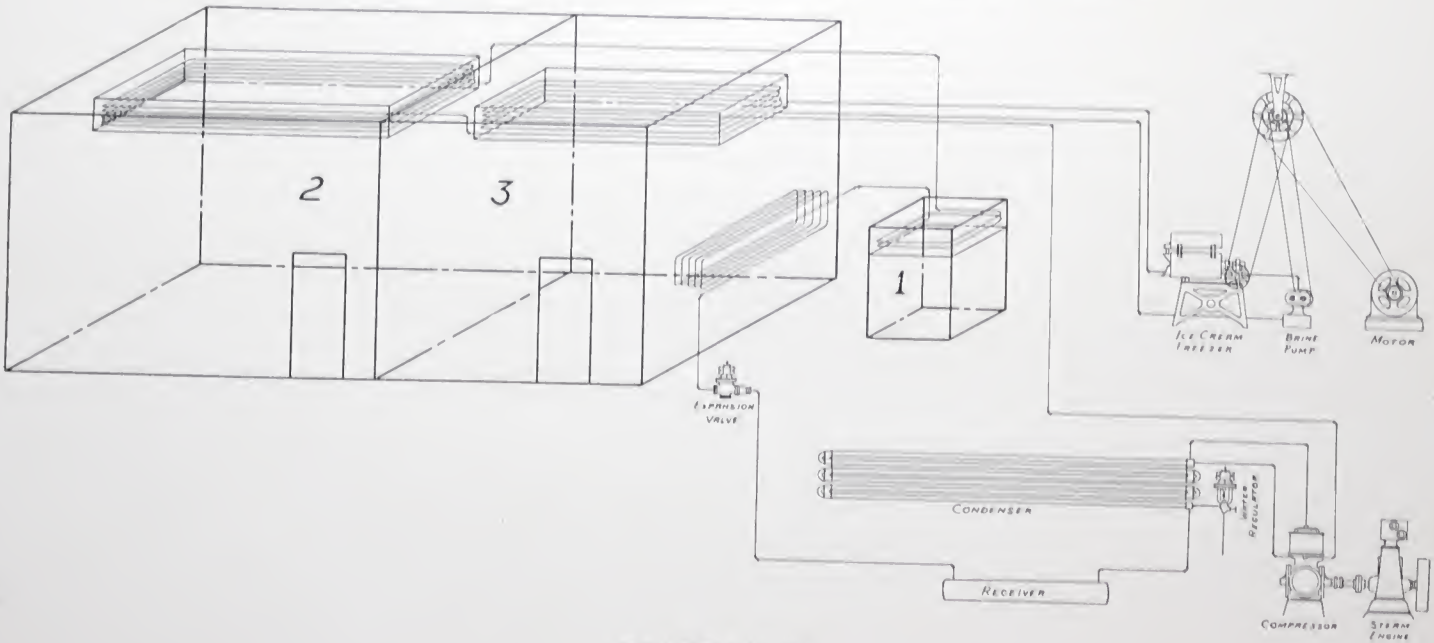


DIAGRAM IV.

GEORGIA STATE BOARD OF HEALTH

No.	Length	Width	Height	Cubic Ft.	Temp.
1	4	4	4	64	32 to 34
2	12	12	10	1440	70

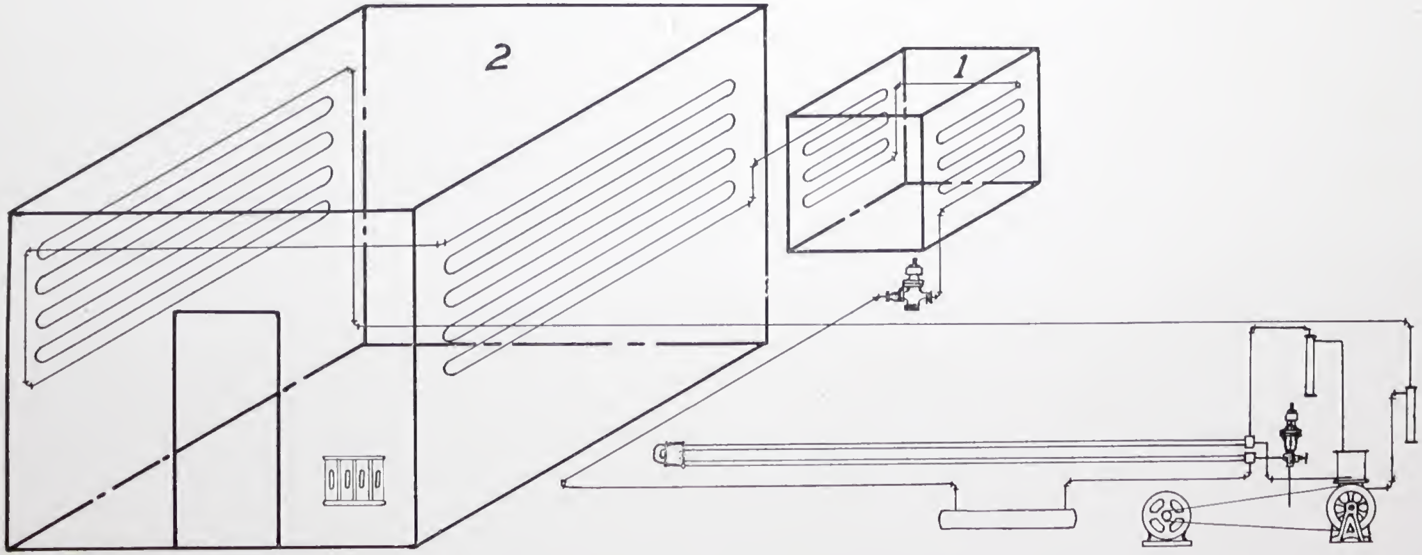


DIAGRAM V.

Childs Restaurant

47 Broadway N.Y.

No.	Use	Length	Width	Height	Cubic Ft	Temp.
1	ICE MAKING TANK	11'	4'	3'		15°
2	MILK	6	2' 4"	2' 6"	35	36
3	MILK	8	2' 4"	2' 6"	47	36
4	MILK	6	2' 4"	2' 6"	35	36
5	WATER	2	1'	2'	4	40
6	COOKS BOX	5	2	3	30	36
7	WATER	2	1	2	4	40
8	WATER	2	1	2	4	40
9	COOKS BOX	5	2	3	30	36
10	VEGETABLES	6	3	3	54	36
11	GENERAL	4	3	3	36	36
12	BAKER	2	3	3	18	36
13	BAKER	2	3	3	18	36
14	OYSTERS	4	3	3	36	36
15	MILK	6	3	3	54	36
16	GENERAL	8	4	7	224	36

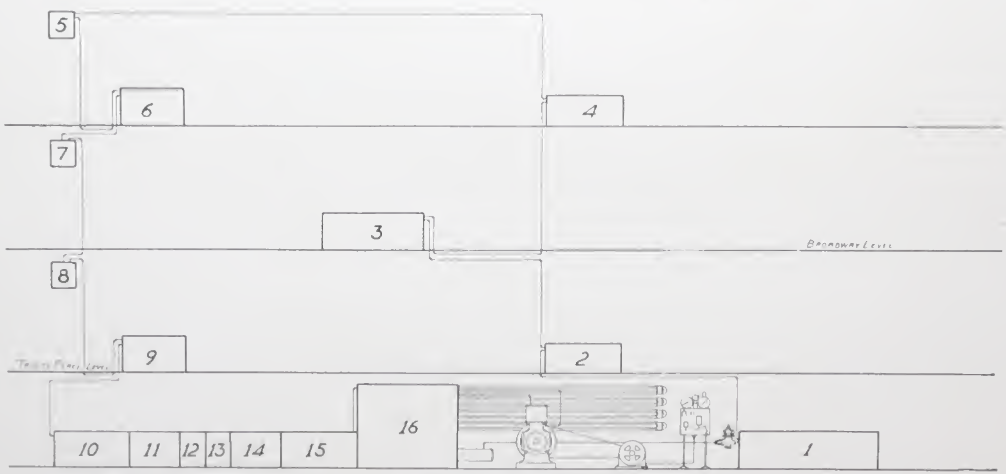


DIAGRAM VI.

These diagrams might be multiplied; but they would simply duplicate features already shown or easily suggested. It may be stated in the broadest terms that this system is available to supply refrigeration under the most exacting conditions, such as have heretofore been provided for only with the closest personal attention and hand regulation. Where refrigeration equivalent to more than 16 tons of ice per day is required, the capacity can be added to or multiplied by additional machines. Such use of a number of small units accords with the best engineering practice in respect to engines, dynamos and similar machinery.

The achievements of this Company, in supplying automatic refrigeration in the many diverse and complicated conditions under which its plants are in practical operation, until success had been demonstrated, a few years ago would have been pronounced impossible by the most prominent experts. Knowing the amount of manipulation constantly necessary for the operation of large machines used in cold storage refrigeration and the numerous failures in attempting similar results on a smaller scale with the ordinary small machines, they would have been apparently justified in their opinions. But was it not something like eighty years ago that the president of the British Association for the Advancement of Science, in his presidential address, apparently demonstrated that steamships, owing to their enormous fuel requirements, could never cross the Atlantic? So it has always been in the progress of modern industrialism from the time of Watt to the present day **The physical impossibilities of one generation become the commonplace realities of the next.**

QUOTATIONS AND TABLES.

From out of much that has been written and printed about this class of installations, space remains for selecting two only for reproduction. The letter from the management of the Hotel Green, previously referred to, is instructive as giving some operating details from the customer's standpoint. The newspaper article from the Pottsville, Pa., *Evening Chronicle*, Aug. 8, 1908, is a popular account from the viewpoint of a casual observer. The article is quite accurate except that the thermostat maintains an even temperature by automatically starting and stopping the motor.

NEW MODERN STRUCTURE
COMPLETE GARAGE CONNECTED

"A FIRST CLASS COMMERCIAL HOUSE"

F. A. CANTWELL
MANAGER

DANBURY, CONN. July 7 1908

The Auto Refrig Co

Gentlemen

Replying to your Enquiry as to the working of the Refrig Plant installed here a year ago. I beg to say that we have 1200 cubic feet of box space and the machine is driven by a 3 H P Induction motor, costing us @ 4¢ per K. W. Hour 40¢ per day on the years average and we have consumed one 50 # Drum of ammonia. The total cost of our refrigeration is just about 25% of what it would be with Ice @ \$4.00 per Ton and we get a much better result as by a proper regulation of the by-passes between the boxes we can have any temperature desired in the various boxes which are six in number on the line, an effect impossible to attain with the older style Iced box. Repairs up to date have cost us practically nothing and we are well satisfied in every particular with the machine and its work

Yours Very Truly
W. E. Coleman
Steward and Chief Engineer

ICE PLANT FOR HIS CAFE

One of the most novel and complete ice plants, and the first introduced in this section of the State, is that which has just been installed in the business place of Richard Coogan, No. 4 North Centre street. The plant was erected by the Automatic Refrigerator Company ,of Hartford, Conn., and is run by a three horsepower electeric motor. Everything connected with the plant works automatically, and that it is a success has already been fully demonstrated.

The plant is located in the front cellar, and from it coils of pipe run to the various parts of the restaurant and keep the temperature at a given point all the time. These pipes are covered with ice constantly, and the room in the cellar where the beer and porter are kept in kegs, a temperature close to the freezing point is constantly maintained. A large apartment in the cellar has been divided off by Mr. Coogan for food supplies, and this has been supplied with coils of pipe and is kept at an even low temperature which insures the preservation of all perishable foods in first class condition.

Coils of pipe also run to the first floor, where the main dining and bar rooms are located. In the dining apartment a large and very neat cabinet or case has been erected in which all kinds of food supplies are kept for immediate use, such as oysters, clams, crabs and all seasonable viands and pastry of all kinds. Coils of pipe run along the back of this cabinet and insure the preservation and keeping fresh everything placed in it.

So in the bar room. Coils of pipe are placed so as to keep all liquids cool and fresh and when a Chronicle representative was looking over the plant he was shown a bottle of temperance drink which was standing nea rthe coils and which was frozen almost solid. There is no dirt, whatever, caused anywhere by the freezing process, and no tearing about of bottles or other supplies as is required where the ordinary ice supply is used. Everything about the plant works automatically and requires little attention, beyond starting or stopping the motor and watching that the temperature is not forced too low.

Cakes of ice also are frozen in a large vat located in the cellar, for use as needed on dishes or in drinks requiring ice. The entire plant is not only a novelty, but a remarkable piece of mechanical ingenuity, and its introduction stamps Mr. Coogan as one of the most progressive and up-to-date hotel and restaurant men in this section of the State, and his place is up-to-date in every respect.

According to its letter as given above, the Hotel Green, after a year's trial, has found that, with electric power at the rate of four cents per kilowatt hour, the cost of operation was about one quarter of what ice would have cost at $4 per ton; that the refrigeration obtained was of a quality that would have been impossible with ice; and that expenditures for repairs were practically nothing.

Nearly tallying with this statement as to cost is the following table, compiled in relation to a 10 H. P. plant, with a three cent power rate, and based upon the readings of an automatic time recorder.

	JULY		AUGUST		SEPTEMBER		THREE MONTHS	
	Per Cent.	Dollars	Per Cent.	Dollars	Per Cent.	Dollars	Per Cent.	Dollars
Power consumption, if run continuously.	100.0	133 44	100.00	133.44	100.00	133.44	100.00	400.32
Actual power consumption with thermostatic control	73.1	97.54	67 9	90 60	66.1	80 20	69.0	269.34
Actual water consumption.	Cu. Ft. 44,250	26.55	Cu. Ft. 41,050	24.63	Cu. Ft. 36,400	21.84	Cu. Ft. 121.700	73.02
Total cost of refrigeration.		124.09		115.23		102.04		341.36
Cost of ice to furnish equivalent refrigeration at $3 per ton; at $4 per ton.	Tons 110 110	 330.00 440.00	Tons 102 102	 306.00 408.00	Tons 99 99	 297.00 396.00	Tons 311 311	 933.00 1244.00

As will be noticed, the ratio between the three months' operating cost and ice at $3 per ton is nearly as 1 to 3; and between this cost and ice at $4 per ton, is nearly as 1 to 4.

The compressor of this plant, during July in this particular summer, ran only 73.1 per cent. of the time. A compressor, closely calculated as to the duty to be performed, in hot weather may run from seven eighths to all of the time; and, during the entire year, it may average 60 per cent. of the entire time.

The two following tables show the result of readings and observations taken in relation to the two automatically controlled parts of the plant in the Norwich Hospital for Insane, previously shown in Diagram III. As will be observed, the latter part of this summer became rather cool, thus permitting more nearly an average condition being tabulated.

TABLE I, COMPRESSOR.

August, 1908.

Day of Month	OUTSIDE TEMP.		LENGTH OF RUN		Temp. of Brine.
	6 A. M.	6 P. M.	Hours	Minutes	
25	54	78	9	20	17
26	54	72	8	30	17
27	56	72	10	25	17
28	60	72	7	30	17
29	48	71	11	5	17
30	54	76	10	35	17
31	62	82	12	55	17

TABLE II, BRINE PUMP.

September, 1908.

Day of Month	OUTSIDE TEMP.		LENGTH OF RUN		Temp. in Room
	6 A. M.	6 P. M.	Hours	Minutes	
4	46	72	6	20	45
5	54	72	5	30	45
6	54	70	6	0	45
7	62	72	6	40	45
8	58	60	5	15	45
9	48	66	5	30	45
10	48	78	8	15	45

These tables suggest another point in favor of the complete automatic system with its thermostatic control, even in those simple cases where only one or two compartments are to be refrigerated during the day, while their doors are more or less opened, and where over night the doors are continuously closed. In such installations not merely non-automatic machines of other makes, but also the semi-automatic machines of this Company, would have to be of considerably larger size to refrigerate the compartments during the day sufficiently to permit of the machine being shut down over night without too great a rise of temperature. But with the thermostatic control the compressor is started at intervals more infrequent during the night; and thus distributes the work done so as to keep the compartments cold all the time, without the need of super-cooling during the day.

As the power requirements of a complete automatic refrigerating system cover the entire twenty-four hours and are greatest during daylight, progressive electric lighting companies are making very material reductions from their maximum rates in favor of this class of power users. A four or three cent rate is very common. In some localities a two cent rate prevails. To the most advanced central station managers the question of a day load presents itself something as follows: When the lamps are out the lighting plant stands idle and is earning nothing; hence, after paying for the extra fuel and for the additional attendance upon the machinery and after making a slight allowance for the wear and tear on the plant, all the income from a day load is clear gain; and this class of business should be encouraged by a low power rate.

ESTIMATES.

As can be appreciated from the diagrams previously given, each projected installation is a separate engineering problem, both physically and as to cost. To enable this Company to calculate the refrigeration requirements of any particular building and to make a proposal in relation to it, data should be supplied such as are called for by the blanks appearing on the following leaves.

Also a rough sketch of the rooms or boxes should be made, showing their relative arrangement; and any special conditions should be described.

Architects in dividing the work to be done in the erection of a building should provide for a separate contract to cover the refrigerating system; and should not include this kind of special technical work as a part of any heating, lighting or plumbing contract.

Communications may be addressed to

THE AUTOMATIC REFRIGERATING COMPANY,

630 Capitol Avenue,

Hartford, Conn.

DATA SHEET.

Room I.	Room II.	Room III.	Room IV.		
				Length	Dimensions of Room
				Width	
				Height	
				Used for	
				Lbs. Cooled Daily	
				From Temp. of	
				Outside Temp.	
				Desired Temp.	
				Thickness of Walls	
				Wall Construction	
				Is Door often Opened?	

Voltage____________________ D. C. or A C.____________________

Phase____________________ Frequency____________________

Source of Water Supply, ____________________

Summer Temp. of same ____________________

Max. Amt. of Ice now used ____________________

Signed ____________________

Address ____________________

Return to THE AUTOMATIC REFRIGERATING COMPANY,
HARTFORD, CONN.

DATA SHEET.

Room I.	Room II.	Room III.	Room IV.		
				Length	Dimensions of Room
				Width	
				Height	
				Used for	
				Lbs. Cooled Daily	
				From Temp. of	
				Outside Temp.	
				Desired Temp.	
				Thickness of Walls	
				Wall Construction	
				Is Door often Opened?	

Voltage ______________ D. C. or A. C. ______________

Phase ______________ Frequency ______________

Source of Water Supply, ______________

Summer Temp. of same ______________

Max. Amt. of Ice now used ______________

Signed ______________

Address ______________

Return to THE AUTOMATIC REFRIGERATING COMPANY,
HARTFORD, CONN.